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### **Designing Durable Icephobic Surfaces**

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Ice accretion has a negative impact on critical infrastructure, as well as a range of commercial and residential activities. Icephobic surfaces are defined by an ice adhesion strength  $\tau_{ice} < 100$  kPa. However, the passive removal of ice requires much lower values of  $\tau_{ice}$ , such as on airplane wings or power lines ( $\tau_{ice} < 20$  kPa). Such low  $\tau_{ice}$  values are scarcely reported, and robust coatings that maintain these low values have not been reported previously. Here we show that, irrespective of material chemistry, by tailoring the crosslink density of different elastomeric coatings, and by enabling interfacial slippage, it is possible to systematically design coatings with extremely low ice-adhesion ( $\tau_{ice} < 0.2$  kPa). These newfound mechanisms allow for the rational design of icephobic coatings with virtually any desired ice adhesion strength. By utilizing these mechanisms, we fabricate extremely durable coatings that maintain  $\tau_{ice} < 10$  kPa after severe mechanical abrasion, acid/base exposure, 100 icing/de-icing cycles, thermal cycling, accelerated corrosion, and exposure to Michigan wintery conditions over several months.

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